"What's the Scoop on Kitty Litter?

Helping Audrey and Bailey Go Green

Summary: Students will perform a consumer analysis on clay based kitty litter and at least two alternative products that are advertised as being ***biodegradable.***

Objectives: Students will apply critical thinking skills to a real life consumer choice that impacts the environment. They will be exposed to the complexity of even seemingly simple household level issues.

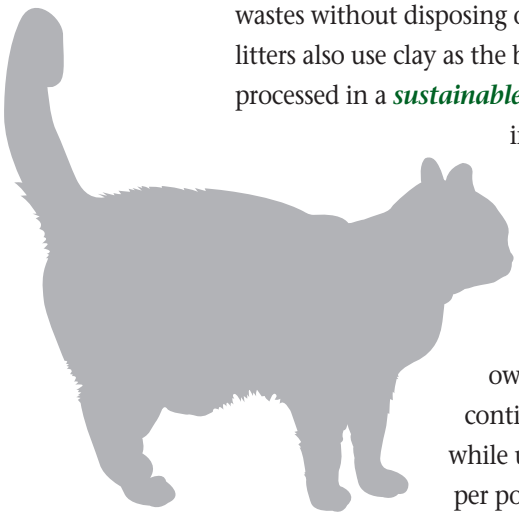
Background Information:

A quick review of current publications, internet sites and blogs for people who are trying to lessen the negative impact they have on the environment, reveals a hot or should we say smelly topic – what's the best kitty litter to use? And what's the best way to dispose of it? Ms. Deborah Kushner of Nelson County, VA, who is both environmentally conscious and a cat lover, has discovered what apparently thousands of other similarly minded pet owners have, there may not be clear answers when it comes to helping their cats go ***green.***

Like many other products, the environmental impact of kitty litter occurs at two levels, the production process used to manufacture it and the disposal of the litter itself. Many people are uncomfortable with the idea that clay, which comprises the bulk of traditional kitty litter, is often strip minded from the earth. ***Strip mining*** may cause long term deforestation of the area and negatively affect water quality and wildlife habitat among other environmental problems, depending upon the actual mining practices employed. In addition to the objections regarding the production process, many cat owners don't like the lack of absorbency (of both liquids and odors) when it comes to traditional clay litters. A large portion of litter often has to be replaced at once, which can be costly and produce a high volume of waste. Traditional clay litters cost approximately $.13 per pound.

Numerous sources estimate 8 billion pounds of cat litter are sent to U.S. landfills annually. For homeowners such as Ms. Kushner, who recycle everything their community ***transfer station*** accepts, kitty litter can account for up to 80% of their total household waste. Traditional clay litters are the least expensive per pound to purchase but if the homeowner resides in a community that charges by the pound for trash pick-up, the annual cost of kitty litter removal may run as high as $400 for multiple cats.

In recent years, a variety of clump forming kitty litters which allow the cat owner to scoop out wastes without disposing of the entire pan of material as often, have become available. Most of these litters also use clay as the base, although several brands marketed as "All Natural" state that the clay is processed in a ***sustainable*** or environmentally friendly manner. The most common clumping agent in clay litters is sodium bentonite. It often occurs naturally in clay soils with high quartz content or may be added in the production process. When the cats use the litter box, their wastes form clumps which their caretaker can scoop out. However, wastes with clumping agents should not be flushed down the toilet because the clumps can swell in the water and cause clogs. Although it has been refuted by veterinarians, pet owners have expressed concern that the clumping nature of these litters may continue at the particle level inside the cat's lungs, if they inhale litter dust while using the box. The retail price for scoopable clay litters averages about $.50 per pound.



Consumers, including Ms. Kushner, who have tried to compost clay based litters have not been very successful. ***Composting*** can be a tricky process. Although it occurs naturally and at times rapidly in healthy ecosystems, it takes a fair amount of attention on the part of homeowners who are trying to compost kitchen scraps and yard waste in the less natural conditions of their backyards. Micro-organisms, including bacteria and fungi, and larger soil animals such as earthworms and pill bugs, turn organic matter into compost. To achieve, odor and ***pathogen*** free, usable soil like compost, it takes the right combination of air flow, sunlight, water and organic material to aid the decomposition process. Clay is a ***colloid*** with the smallest type of soil particles, so there is little chance of clay litters changing drastically in appearance or texture through a composting process. The particles also have an electrical charge that adhere to phosphorous and other substances that can increase water pollution through erosion and transport into nearby streams and rivers.

Litters with cat feces in them must be composted separately from plant matter homeowners plan to eventually use in their gardens. Health officials say the wastes of any carnivore need to breakdown for at least two years before the compost is ever incorporated into garden soil that will produce food for people. An estimated 30% of the cat population carries the ***protozoan*** parasite Toxoplasma gondii, which can cause the disease, toxoplasmosis, in humans. Toxoplasmosis can be fatal to infants and adults with weakened immune systems. Cats that are kept indoors are less likely to carry the parasite and veterinarians can test cats for the condition. Ideally, anyone wanting to compost kitty litter needs enough property to maintain a healthy distance between all their composting operations. Cat waste can be buried separately from the litter or flushed but only if the homeowner does not use litter with a clumping agent and has their own private ***septic system.*** Many people who compost kitty litter use the final product in their ornamental tree, shrub and flower beds only.

Currently, there are four main types of biodegradable cat litter on the market, small pellets made from pine (sawdust), recycled newspapers, corn and wheat based litters. The pine and wheat based products appear to be most available at retail stores in Virginia, although each of the products can be obtained through on-line orders. Detailed information on the production process of the bio-degradable litters is not printed on the packages but is available in a limited manner on the company websites. Retail prices of these products range from approximately $.80 – $1.00 per pound, almost twice that of clay litters, but less litter may be used over time. Initially, these products may seem to be the answer for environmentally conscious cat owners, but green lifestyle blogs contain numerous accounts that the biodegradable litters aren't as absorbent, don't prevent odors and that the pellets stick to the cat's paws and get ingested or tracked over the house. Optimists encourage cat owners to try again as manufacturers have made improvements since these products were first introduced in the early 1990's. Dust, which may irritate cats with allergies or other respiratory conditions, has been reported as a problem in one form or another for all types of litters.

Stories also abound of cats that have been trained to use the toilet and flush afterwards, and cats who do their business outdoors with the family dog and return indoors promptly without preying on song-birds or other undesirable behaviors. New technologies include a litter-free cat commode which is hooked up to the house's plumbing system. Clearly, personal philosophy, available space, purchase and disposal cost and pet health are among the many considerations when it comes to the selection of cat litter.

Environmental Science Vocabulary:

Biodegradable	Capable of being decomposed by biological means, especially by bacteria action.
Strip Mining	A type of surface mining where large quantities of soil and rock are removed to expose deposits of mineral. Typically abandoned (afterward) in the past, today's sites often go through a reclamation process, where vegetation is re-established.
Transfer Station	A community based facility where solid waste is taken from residents and collection vehicles, compacted and sent on larger vehicles to regional landfills or other destinations.
Sustainable	Practices that ensure the long term availability of a resource.
Composting	The process of converting plant matter into a soil amendment that is used in gardening or landscaping.
Pathogen	Any microorganism or virus that can cause disease.
Colloid	Coined by Scottish chemist Thomas Graham (1805-69) a solid, liquid or gaseous substance made up of very small, insoluble, non-diffusible particles.
Protozoan	Members of the phylum Protozoa, mostly microscopic organisms made up of a single cell or group of individual cells living chiefly in water but including may parasitic forms.
Septic System	An on-site system designed to treat and dispose of domestic sewage. A typical system consists of a sub-surface tank where solid wastes are decomposed by anaerobic bacteria and a drain field composed of a network of pipes surrounded by stone filled trenches that disperse the wastewater. An estimated 25% of the U.S. population use a household septic system.

Materials

- Optional – Pictures of the items such as apple core and cigarette filter and matching decomposition rate cards from "How Long Will It Be There?" warm-up activity.
- Access to Internet
- Student Pages – Kitty Litter Product Comparison and Final Rating Charts
- At least three different types of kitty litter in their original containers. At least one should have a clay base (either traditional and/or clumping) and two should be "biodegradable" such as the wheat or pine/paper product base. To share the costs, teachers should check to see if another science teacher or civics teacher is interested in using this lesson, as a relatively small amount of each litter is needed.
- Optional – Materials for testing the absorbency of each type of litter, such as funnels, coffee filters and beakers.
- Optional – containers, organic material, soil and spray bottles if performing a kitty litter decomposition experiment.

Procedure:

1. Begin discussion on the length of time common items need to decay. "How Long Will It Be There?" from *Pollution Solutions* solid waste curriculum at www.deq.virginia.gov/export/sites/default/education/pdf/ps12.pdf may serve as a warm-up activity.

2. Review the challenges faced by environmentally conscious cat-owners from the Background Information section of this lesson. Discuss the meaning of any new vocabulary words.

3. Optional* – Set-up an experiment to test the biodegradable nature of the pine and wheat based cat litters compared to a clay based litter. Students whose families have a cat may also volunteer to use each type of litter for a week and record the results.

4. Divide the class into research teams or small groups of about 4-5 students. Each group can be assigned to thoroughly research one product and then the entire class can do a product comparison and rating together, or each small group can research, compare and rate all of the available litter products.

5. Provide each group with the cost of the product and the opportunity to review the assigned litter product(s) in its original packaging. Discuss the disposal of the container itself.

6. With supervision, have small groups do an internet search on their product(s) and complete the student data sheets. Students may want to look on the homepage of the manufacturer for product information and claims, as well as check for reviews from cat owners on Green lifestyle sites.

7. Read the information from this lesson on Deborah Kushner's cats, "Bailey" and "Audrey." Either in small groups or as a class, rate the cat litter products for use by Ms. Kushner or cat-owners in other residential situations. If completed in small groups, have a representative(s) report to the class and provide the basis or justification for their ratings and recommendations. Any drawbacks or exceptions to their recommendations should be provided.

** There are many other products available. Websites are typically printed on the container.*

Assessment:

Individuals and small groups can be evaluated on their participation in class discussions, the thoroughness of their research, information and data recording, and the quality of their oral presentation.

Try This: Make Experimental Compost Piles

- Have students assemble small compost bins to visualize and compare the biodegradable nature of the kitty litters under study. Large, clay flower pots with saucers, water jugs with the tops removed, plastic dish pans or storage containers can be used to hold the materials. Piercing plastic containers with small holes will aid the air flow and decomposition process. If using a plastic storage container, the lid could be placed under it, to catch any seepage or debris. Soil with high organic matter or previously composted material should be placed on the bottom of the container as a base layer.

- Next, grass clippings or other nitrogen source such as apple peelings should be added.

- Then, the "test" layer (unused kitty litter samples) followed by a layer that provides carbon to the system. Possibilities include wood chips, shredded paper, straw or leaves.

- Finally, the organic soil or compost is placed on the top surface.

- Comparative layers in each of the composting containers should be the same thickness. Have students gently turn over the pile with hand trowel or rubber spatula – once every few days for the first two weeks, then once each week. The composting containers should be kept moist, but not soaked. Spray bottles work well for applying water. Containers should be kept where there is a light source and away from activity, in the event there is an odor, but this should be minimal if no other items are used. Teachers may want to check with the custodial staff about an alternative outdoor location as soil organisms may be limited in an indoor environment. Since there may not be enough time for the materials to actually compost, observations can be made as whether decomposition has begun or not.

- For information about composting, contact Virginia Cooperative Extension. Local offices are listed at www.ext.vt.edu/. Helpful publications are available at the same site under "Educational Programs and Resources" and then, "Home Gardening."

Meet Audrey and Bailey

As kittens, Audrey and Bailey were strays living on the busy streets of Charlottesville. Today, they live with Ms. Deborah Kushner of Nelson County, who provides them with a healthy, loving home. Most of Nelson County is rural in nature.

Ms. Kushner's home has its own well and septic system. Audrey and Bailey are kept inside the house so that they are neither harmed by or prey on wildlife. As both an environmentally conscious person and cat-owner, Ms. Kushner faces challenges in managing Audrey and Bailey's litter box. She routinely recycles all of the materials accepted by her local transfer station and composts yard and kitchen waste. Typically, she only produces one small bag of regular trash each week. Ms. Kushner would like to lessen the amount of cat litter she must dispose of however.

Currently, she uses a sustainably-produced, clay-based cat litter, which she has not had any luck composting in her sizable yard. She tried a wheat-based, biodegradable litter in the past, but the dust irritated Audrey who has a chronic cough from her life as a stray. Bailey also has special needs. She has a bad knee which she has to keep straight when she sits down. Ms. Kushner found the alternative litters to be expensive, not as absorbent and difficult to scoop because of the pellet size. Yet, she is not totally happy about using the clay based litter.

What suggestions do you have for Ms. Kushner and her kitty litter dilemma?

Helpful Websites

Cat Litter Manufacturers:

- www.freshstep.com – "Fresh Step Scoopable Clumping Cat Litter"
- www.petbrand.com – "9 Lives Scoopable Cat Litter"
- www.wholefoodsmarket.com – "365 All Natural Scoopable Cat Litter"
- www.swheatscoop.com – "Sweat Scoop Natural Wheat Litter"
- www.felinepine.com – "Feline Pine Original Litter"
- There are many other products available. Websites are typically printed on the container.

Cases in Corporate Conservation

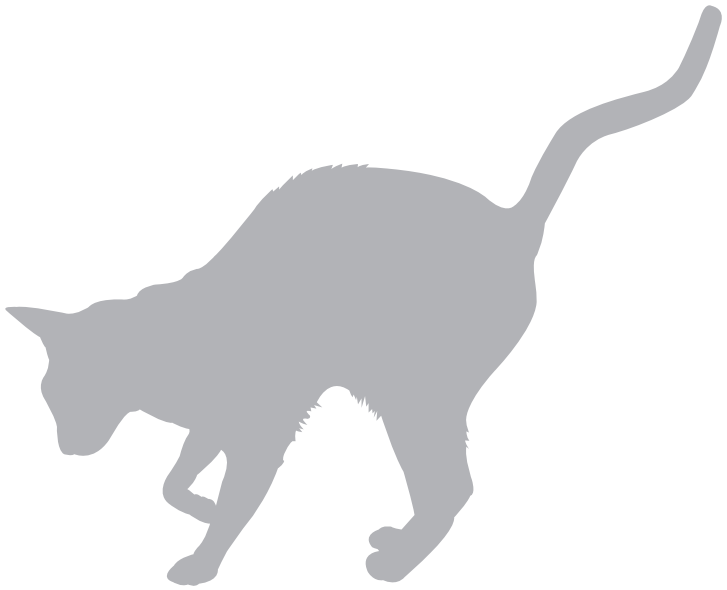
- Luck Stone

  The Environmental Management System (EMS) provides a structured means to measure and manage environmental performance. It also provides a platform for continuous improvement and "beyond compliance" environmental performance. Luck Stone has already implemented EMS at several of our plants, and plans to implement it at more plants over the next few years. We have created the New Kent Environmental Bank as compensation for wetlands impacts, and have begun stream restoration activities at several sites.

Green Living Websites and Blogs:

Since these sites contain comments made by adults, teachers may wish to download articles for student use as opposed to having them view the entire website.

- www.bravenewleaf.com
- www.greenstar.coop – Greenleaf Newsletter Articles
- www.greenhome.com



Student Data Sheet #1

Team Members: _____

Kitty Litter Product Comparison

Research and evaluate each feature of the sample kitty litter for use by Ms. Kushner or cat owners in other residential settings, as assigned by your teacher. The features to evaluate are:

A. ***Manufacturing Process:*** How is the product made?

B. ***Usage:*** What are the advantages or disadvantages from a consumers point of view?

C. ***Disposal:*** What are the pros and cons for each product if being placed in a landfill?

Kitty Litter Name	A. Manufacturing Process:	B. Usage:	C. Disposal:
	Positive Points	*Positive Points*	*Positive Points*
	Negative Points	*Negative Points*	*Negative Points*
	Positive Points	*Positive Points*	*Positive Points*
	Negative Points	*Negative Points*	*Negative Points*
	Positive Points	*Positive Points*	*Positive Points*
	Negative Points	*Negative Points*	*Negative Points*
	Positive Points	*Positive Points*	*Positive Points*
	Negative Points	*Negative Points*	*Negative Points*

A. Consider the amount of natural resources (i.e. soil, trees, grain crops, water, etc.) that were consumed in the production of the litter and its packaging, as well as the energy needed to manufacture and transport it.

Determine if the package or container can be composted, recycled or reused. In general, processes that involved non-renewable resources should be scored lower than those that are renewable.

B. Consider the relative cost of the litter, how absorbent it is, how often it would need to be replaced and any reported problems in terms of pet health, tracking litter out of the box, etc. Absorbency could be compared, by placing about one cup of the litter in a large funnel lined with a cone shaped coffee filter, placing the funnel in a 500 ml beaker, pouring the same amount of water (i.e. 100 ml) into the litter and observing how much collects in the beaker. Testimonials from cat owners can be obtained on the litter manufacturer's homepage, on green lifestyle blogs or possibly classmates who had volunteered to use the litters with their own cat(s.)

C. Determine if the litter can be flushed (and under what circumstances) or composted or whether it is likely to become part of the municipal waste stream as trash.

Student Data Sheet #2

Team Members: _____

Kitty Litter Product Ranking

Based on your notes from Data Sheet #1, rank each kitty litter product against the others, for each of the criteria, with "1" being the best choice, "2" for the second choice and so on. Then, add the all of the component scores (or rankings) you gave a product together, to determine the final score for that type of litter. Do this for each of the products. In this exercise, the ***lowest*** score will win or receive the number one rating. A low score represents less impact on the environment. If you are using Ms. Kushner, who is a rural resident with a large yard, as your example, you should take notes on how your final rankings may change if the consumer was an apartment dweller.

Kitty Litter Name	A. Manufacturing Process Ranking:	B. Usage Ranking:	C. Disposal Ranking:	Total Score (A+B+C)	Final Ranking (Lowest Total Score = 1)

Note: This is a basic decision making process where each point of consideration is weighted equally. For cat-owners who live in an apartment, composting will most likely not be an option. It is recommended that those on municipal sewerage systems (in towns and cities) never flush their cat's waste regardless of whether they believe them to be pathogen free. A cat's health conditions may prevent them from using certain litters and an owner's personal beliefs may prohibit them from using products despite the manufacturer's claims. Small groups may want to comment of these exceptions or other pertinent information when giving their reports.